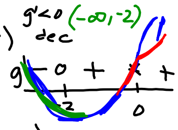
24. a) local extrema
min is $6\sqrt[3]{-2}$ b/c g' changes from − to + at $x=-2$

b) inc $(-2,0)\cup(0,\infty)$

c) $g'<0$ $(-\infty,-2)$ dec



$g(x) = x^{1/3}(x+8)$

$g'(x) = x^{\frac{1}{3}}\cdot 1 + \frac{1}{3}x^{-2/3}(x+8)$

$g'(x) = \frac{3\sqrt[3]{x^2}}{3\sqrt[3]{x^2}}\sqrt[3]{x} + \frac{x+8}{3\sqrt[3]{x^2}} = \frac{3x+x+8}{3\sqrt[3]{x^2}}$

$\sqrt[3]{x^2}\cdot\sqrt[3]{x}$
$\sqrt[3]{x^3}$
x

$= \frac{4x+8}{3\sqrt[3]{x^2}}$

$g'=0$ $x=-2$ min $y=6\sqrt[3]{-2}$

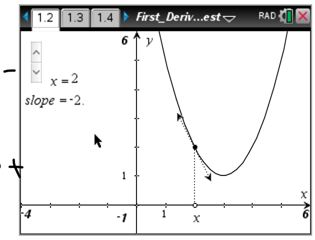
$g' = ∄$ $x=0$ $y=0$ neither

4.3 Connecting f ' and f '' with the graph of f

first derivative test for local extrema of continuous functions

local max where f' changes from + to −

local min where f' changes from − to +



find the local extrema:

y=(x^2 - 3) e^x

y': + 0 − 0 + over -3, -2, -1, 0, 1, 2

$y = (x^2-3)e^x$

$y' = (x^2-3)e^x + e^x\cdot 2x$

$y' = e^x(x^2-3+2x) = e^x(x^2+2x-3)$

$y' = e^x(x+3)(x-1) = 0$ $x=-3$ $y=\frac{6}{e^3}$

critical points $x=1$ $y=-2e$

max at $x=-3$
b/c y' changes from + to − max is $\frac{6}{e^3}$

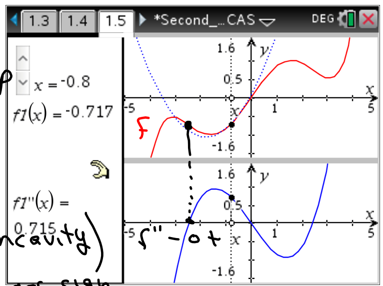
min at $x=1$
b/c y' changes from − to + min is $-2e$

concavity test

$f''>0$, f concave up

$f''<0$, f concave down

inflection pt (f changes concavity) where f'' changes sign



Find all points of inflection for the graph of $y = e^{-x^2}$

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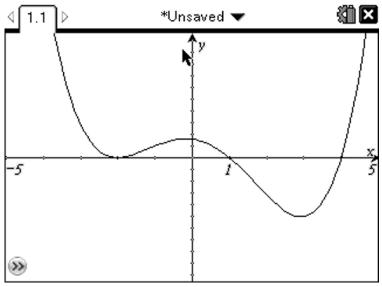
This is the graph of f '. Sketch a possible graph of f



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second derivative test for local extrema

Find the local extrema using the second derivative test
y=x^3 -12x - 5

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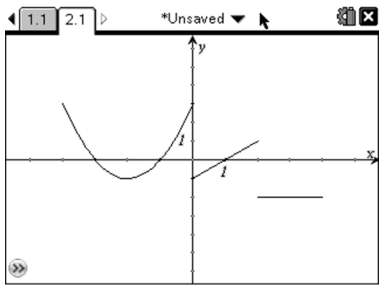
Given the graph of f ' sketch a possible graph of f



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